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Short Communication

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Synergistic effect of human Bone Morphogenic Protein-2 and Mesenchymal Stromal Cells on chronic wounds through hypoxiainducible factor-1 α induction

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Abstract:

Chronic skin ulcers and burns require advanced treatments. Mesenchymal Stromal Cells (MSCs) are effective in treating these pathologies. Bone Morphogenic Protein-2 (BMP-2) is known to enhance angiogenesis. We investigated whether recombinant human hBMP-2 potentiates the efect of MSCs on wound healing. Severe ulceration was induced in rats by irradiation and treated by co-infusion of MSCs with hBMP-2 into the ulcerated area which accelerated wound healing. Potentiation of the efect of MSCs by hBMP-2 on endothelial repair improved skin healing. HBMP-2 and MSCs synergistically, in a supra additive or enhanced manner, renewed tissue structures, resulting in normalization of the epidermis, hair follicles, sebaceous glands, collagen fibre density, and blood vessels. Co-localization of MSCs with CD31 + cells suggests recruitment of endothelial cells at the site of injection. HBMP-2 and MSCs enhanced angiogenesis and induced micro-vessel formation in the dermis where hair follicles were regenerated. HBMP-2 acts by causing hypoxia-inducible factor-1 α (HIF-1α) expression which impacts endothelial tube formation and skin repair. This efect is abolished by siRNA. These results propose that new strategies adding cytokines to MSCs should be evaluated for treating radiationinduced dermatitis, burns, and chronic ulcers in humans.

Biography:

For 25 years, he has been developing gene and cell therapy using non-human primates, immune-tolerant mice and rats to protect against the side effects of radiation. He collaborates with clinicians to develop strategies for treatment of patients after radiotherapy overexposures. He has participated in the first establishment of proof of concept of the therapeutic efficacy of Mesenchymal stem cells (MSCs) for the treatment of hematopoietic deficit, radiodermatitis and over dosages of radiotherapy. He has contributed to the first reported correction of deficient hematopoiesis in patients (graft failure and aplastic anemia) thanks to intravenous injection of MSCs restoring the bone marrow microenvironment, mandatory to sustain hematopoiesis after total body irradiation. He is scientific investigator of Clinical phase II trial evaluating the efficacy of systemic MSC injections for the treatment of severe and chronic radiotherapy-induced abdomino-pelvic complications refractory to standard therapy (NCT02814864, Hirsch Index 27)